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The observations of Littrow and Maskelyne referred to in the memoir make the figure a prolate spheroid; those of Carlini, an oblate spheroid.

In a paper in the *Ast. Nach.* t. ix. p. 365 (1831), M. Bianchi has applied the above formulæ to observations taken at Modena in the years 1828 and 1829: the figure is found to be an oblate spheroid; but the vertical diameters alone, the horizontal diameters alone, and the two conjointly, give for $\frac{1}{2}e^2$ the very discordant values $\frac{1}{1925}$, $\frac{1}{110}$, $\frac{1}{249}$. As to the deduction of the true ellipticity from the observed figure of the disk, see also Mr. Grant's "Note on the correction to be applied to the apparent ellipticity of a Planet, in consequence of the elevation of the Earth above the plane of the Planet's Equator," *Monthly Notices*, vol. xiii. (1853), pp. 192–196.

RECENT PUBLICATIONS.

Théorie du Mouvement de la Lune. Par M. Delaunay (premier volume) being t. xxviii. of the *Mém. de l'Acad. de Paris.*

The following is in substance the account of the work as given by the author in the *Comptes Rendus* (séance du 24 Déc. 1860):—

"I have already had occasion to explain the object of the great work which I undertook fourteen years ago on the theory of the Moon. It is known that my end was to effect a new analytical determination of the lunar inequalities carrying the approximations notably further than had been done before me. Concentrating at first all my efforts on the inequalities due to the disturbing force of the Sun, and admitting in the calculation that the motion of the Sun takes place according to the laws of elliptic motion, I proposed to myself to investigate all the parts of these inequalities which are not of an order superior to the seventh. M. Plana, in his great work on the Lunar Theory, had stopped at the inequalities of the fifth order. The method employed by me consists in a series of operations similar to each other, whereof each has for its object to get rid of one of the periodic terms of the disturbing function by the aid of a simple change of variables. When, by the application of this method, we have removed from the disturbing function the terms of most importance in regard to the magnitude of the inequalities to which they give rise, the question is simplified, and can then be treated as easily as if it related to the inequalities of a Planet or the Sun.

"The volume which is just printed contains a part of the formulæ which I have obtained by operating in conformity with the above method. It is composed of five Chapters. The first is devoted to the establishment of the differential equations, the integration whereof gives the inequalities of the motion of

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the Moon; the second, to the development of the disturbing function and of the elliptic values of the Moon's co-ordinates; and the third, to the exposition of the analytical method which I have imagined for integrating the differential equations by dividing the work so as to enable the further development of the approximations in each part. These three Chapters, much less extensive than the others, furnish a kind of introduction to the actual working out of the method, which is developed in the following chapters. The fourth Chapter contains the complete development of the disturbing function, with the different modifications it has successively undergone by means of a succession of 57 operations effected upon it to disembarrass it of the most important terms; this development contains 460 terms. Lastly, the fifth Chapter contains all the details of the establishment of the formulæ relative to the 57 operations in question. The second volume, the printing of which I hope to commence forthwith, will contain, 1°, the different formulæ intended for taking account of the terms which remain in the disturbing function after the foregoing 57 operations have been effected; 2°, the expressions of the three co-ordinates of the Moon with *all* their inequalities to the seventh order inclusive for the longitude and the latitude, and to the fifth order for the reciprocal of the radius vector; 3°, lastly, several chapters intended to complete the expressions for the co-ordinates of the Moon by taking account of all that was provisionally neglected in order to the consideration of only the capital part of the question. Desiring that my work should inspire to astronomers as much confidence as possible, I have neglected none of the means which appeared to me proper for facilitating the verifications which may occur to any of them. In particular I may refer to the indications accompanying the different parts of the disturbing function (Chap. IV.), and which have for their object to show the origin of each part.

"The simplicity and regularity of the method which I have followed, for the inequalities of the Moon's motion, have permitted me to set forth the series of the operations with all desirable clearness, without the necessity of long explanations. Thus, the last two chapters of my first volume, which occupy seven-eighths of the entire volume, consist almost exclusively of formulæ, with very little text. Many of the formulæ are very long; in particular that which forms the whole of Chapter IV., and which covers 138 pages. The printing of the volume presented the greatest difficulties, and it has required all the skill and zeal of M. Bailleul, the Director of the Mathematical Printing Establishment of M. Mallet-Bachelier, to bring the work to a conclusion, and to render all the parts of the volume agreeable to the eye without injury to the perfect clearness of the formulæ."

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